September 29, 2020 Reference No. 11208393-320

Mr. Robert Thompson
Remedial Project Manager
United States Environmental Protection Agency
Region V
77 West Jackson Boulevard
Mail Code SR-6J
Chicago, Illinois
60604

Dear Mr. Thompson:

Re: Response to United States Environmental Protection Agency (USEPA) Comments
Floodplain Soil Investigation – Sampling Results
South Dayton Dump and Landfill Site, Moraine, Ohio

This letter presents responses to USEPA comments, dated August 4, 2020 regarding the Floodplain Soil Investigation letter dated June 9, 2020. GHD has prepared this letter on behalf of the Respondents to the Administrative Settlement Agreement and Order on Consent (ASAOC) for Remedial Investigation/Feasibility Study for OU1 and OU2, Docket No. V-W-16-C-011 (Respondents).

For ease of reference, the U.S. EPA comments are presented below followed by GHD's response. The Floodplain Soil Investigation letter ("FSI Letter") has been modified as noted by the responses provided below.

Comment 1 - Section 2, Page 2, Last Paragraph:

It is stated that polychlorinated biphenyls (PCBs) were detected infrequently. This is not supported by the data; 33 of 46 samples adjacent to OU1 had detections of Aroclor 1254 and upstream samples had 16 of 18 samples with Aroclor 1254 detections. Please clarify this statement.

Response

The referenced section discusses the results of the samples collected in 2019, i.e., 18 samples and two duplicates collected adjacent to OU1. The FSI Letter has been modified to indicate the frequency of PCB detections compared to other parameters in the 2019 soil samples.

Comment 2 - Section 3.1, Page 3, First Bullet:

According to Section 1, 2019 samples were not analyzed for VOCs. Please clarify that this applies only to 2018 samples.

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Response

The FSI Letter has been modified to state that VOCs were analyzed in the 2018 soil samples only. The soil samples collected in 2018 were analyzed for VOCs and other parameters as reported in the Site Characterization Technical Memorandum for the Soil/Fill and Soil Gas Investigation (SCTM Report) dated July 17, 2019. The 2019 soil sampling event focused on SVOCs, PCBs, and metals based on initial screening as recommended by the SCTM Report.

Comment 3 - Section 3, Page 2:

Provide additional detail with respect to ecological screening values (ESVs), including: 1) references to sources; 2) explanation as to why floodplain soils were screened versus both soil ESVs and sediment ESVs; and, 3) clear presentation as to which ESVs were exceeded (soil, sediment or both, etc.).

Response

The FSI Letter has been modified to include references for the ESVs and explanation for screening using both soil ESVs and sediment ESVs as follows. The floodplain soil sample results were conservatively compared to both soil ESVs and sediment ESVs consistent with the initial presentation included in the SCTM Report. This screening approach is based on the characteristics of the floodplain area which is normally dry but periodically subject to inundation when GMR water levels rise sufficiently. The FSI Letter also includes modifications to present separate screening results based on soil ESVs and sediment ESVs.

Comment 4 - Section 4, Body of Text:

Refer to Comments 11 and 13 below. The results of this section should be updated if results are altered based on modifications to statistical tests.

Response

No changes to Section 4 are required based on the updated statistical assessment (Attachment B).

Comment 5 - Section 5, Page 7, Second Paragraph:

It is stated that the most frequently detected parameters include Aroclor 1254, which conflicts with the statement made in Section 2 stating that the detection of Aroclor 1254 was infrequent.

Response

See response to Comment 1.

Comment 6 - Section 5, Page 7, Third Paragraph:

Recommend adding text acknowledging that two metals (calcium and selenium) were detected adjacent to OU1 at concentrations statistically above upstream levels.

Response

The FSI Letter has been modified by adding the following sentence to Section 5. “Two metals (calcium, selenium) were determined to have greater concentrations in the Adjacent samples and conversely 18 metals were determined to have greater concentrations in the Upstream samples.”

Comment 7 - Table 4 and Table 6:

References for the ESVs would be appropriate for inclusion in the footnotes to Table 4 and Table 6.

Response

The source of ESVs has been added to the FSI Letter as discussed above.

Comment 8 - Table 4 and Table 6:

In addition to the individual polycyclic aromatic hydrocarbon (PAH) constituents, please present and evaluate PAHs based on Total High Molecular Weight PAHs, Total Low Molecular Weight PAHs, and Total PAHs.

Response

The tables have been modified as requested to include values for Total High Molecular Weight PAHs, Total Low Molecular Weight PAHs, and Total PAHs.

Comment 9 - Table 4 and Table 6:

In addition to the individual Aroclors, present and evaluate PCBs based on Total PCBs.

Response

The tables have been modified as requested to include values for Total PCBs.

Comment 10 – Attachment B, Pages 3 – 5, Sections 2.2 – 2.4:

Include a description of the software used for each of the tests conducted. Alternatively, if calculations were done by hand please include a reference to methods and equations.

Response

The FSI Letter includes revisions to Attachment B (Statistical Evaluation Memo) based on Comments 10 through 17.

The software and methods used have been added to the revised text of Attachment B. Example calculations for cases where spreadsheet calculations were used are provided in Appendix C and Appendix D of Attachment B. A brief summary is provided below:

Statistical Test	Calculation Software/Method
Probability Plots	SYSTAT 10 (commercial statistical software)
Box-Whisker Plots	SYSTAT 10
Data distribution (normality) tests (Shapiro-Wilk, Lilliefors, Anderson-Darling, Kolmogorov-Smirnov)	ProUCL 5.1.002 (USEPA software)
Kaplan-Meier Calculations (means and standard deviations for data with non-detects)	ProUCL
Outlier Tests (Dixon's Test, Rosner's Test)	ProUCL
Relative Percent Difference (RPD) Values	Spreadsheet calculation (Microsoft Excel)
One-sample and two-sample *t*-tests (no non-detects)	SYSTAT 10
Two-sample *t*-test (with non-detects)	Spreadsheet calculation (Microsoft Excel) using ProUCL Kaplan-Meier inputs
Wilcoxon Rank-Sum test	SYSTAT 10
Quantile Test	Spreadsheet calculation (Microsoft Excel) following USEPA's QA/G-9S methodology

Comment 11 – Attachment B, Page 3, Section 2.2, Second paragraph:

The text describes the assumptions of the t-tests while subsequent discussion and statistical tests address the assumption of normality, but the assumption of homogeneity of variance is not further discussed and does not appear to have been tested. Results of t-tests could be biased or inaccurate if the assumption of homogeneity of variance is not met. For example, for t-tests on data without non-detects, ProUCL provides results for an equal variance t-test and an unequal variance t-test, and reports results of an F-test to determine whether the variances were or were not equal. Consider using ProUCL or a similar approach (Helsel 2012). Please revise to include a discussion of how the homogeneity of variance assumption was considered for the t-tests, and if the assumption was tested, describe how it was tested and provide the results. Alternatively, revise the approach per ProUCL and/or Helsel 2012.

Response

The *t*-tests performed were conducted using separate variance forms (Cochrane's or Welch-Satterthwaite methods), which account for the possibility of unequal variances between test groups. This has been clarified in Section 2.2 of Attachment B.

Comment 12 – Attachment B, Pages 3 – 4, Section 2.3:

The results of this section are difficult to interpret in the absence of figures. Consider including simple plots (e.g., station plots with bars or dots representing depth). This would help the reader interpret the magnitude and importance of concentration differences between depth intervals.

Response

As requested, plots were prepared for analytes detected in one or more samples. These are provided in Appendix A of Attachment B.

Comment 13 – Attachment B, Page 4, Section 2.3, Last paragraph:

Add a discussion of whether the assumptions of normality and homogeneity of variance were considered for the one-sample test used to compare depths. The use of the relative percent difference (RPD) should reduce scaling (or distributional) issues, but without graphical presentation and/or statistical tests, it is not possible to be sure test assumptions were met. An alternative to the RPD approach that would also eliminate the scaling would be to use a ranked test.

Response

As requested, additional discussion regarding assumptions has been added to the text of Attachment B. It has been clarified that the homogeneity of variance assumption is not applicable for a one-sample *t*-test, since there is only one data set (which by definition has an equal variance with itself). The normality of the RPD data sets was visually screened using probability plots, which are included in Appendix B of Attachment B.

Comment 14 – Attachment B, Page 4, Section 2.4, First paragraph:

The text states that for t-tests conducted on data sets with non-detects, the Kaplan-Meier product limit estimation methods were used to estimate the mean and standard deviation for use in t-tests. This approach differs from that used in ProUCL and from recommendations of other authors (e.g., Helsel, 2012). Please briefly discuss the rationale and potential benefits or disadvantages to this approach.

Response

The Student *t*-test using KM means and standard deviations was chosen for consistency in testing approach with that used for the uncensored data (i.e., parameters with no non-detects). The basic form of a two-sample *t*-test compares the difference between the two group means divided by a standard deviation estimate (either pooled or separate, depending on the form of the test used – as discussed above the separate variance form was used). The KM procedure produces mean and standard deviation estimates that account for the presence of censored (non-detect) data, so it is very straightforward to calculate the needed test statistic (*t*) and perform the statistical significance test. The potential advantages of this approach include consistency with the other tests run and potentially slightly higher statistical power of detecting an effect if present (rank-based non-parametric alternatives to the *t*-test have approximately 96 percent the power). Potential disadvantages could include reduced ability to correctly identify data distributions in censored data sets and a resulting loss of statistical power if data distributions are mis-specified in testing.

Comment 15 – Attachment B, Page 4, Section 2.4, Third paragraph:

Please provide the probability plots discussed in this section to facilitate review. Alternatively, boxplots could be provided to illustrate the upstream-to-adjacent comparisons.

Response

As requested, probability plots and box plots were generated and are provided in Appendix B of Attachment B.

Comment 16 – Attachment B, Page 5, Section 2.4, Final paragraph:

This paragraph discusses formal tests for outliers as implemented in ProUCL, but it's not clear whether these outlier tests were conducted with this data. If they were not, the paragraph should be removed.

Response

The text was revised in Section 2.4 of Attachment B to clarify the procedure for outlier identification. Outlier presence was initially screened via visual inspection of the probability plots, and suspected outliers were then submitted for formal testing in ProUCL. The results of outlier testing have been added in a new Table 3 and are discussed in the revised text of Attachment B.

Comment 17 – Attachment B, Table 6.

Where data distributions are indicated to have been determined with outliers removed, discuss the implications of this decision in the memo text. Also, please clarify whether the outlier was included for the statistical hypothesis testing.

Response

As requested, additional discussion have been added in Section 3.1 in the text of Attachment B. Data distribution and outlier presence are inter-related items, and the correct specification of data distribution is needed to correctly evaluate outliers (e.g., an outlier in a normal distribution may not be an outlier in lognormal distribution). The vast majority of the outliers identified were found in the Upstream (background) samples, which are not affected by conditions at the site and therefore retained in the statistical tests. For the few cases where outliers were found in the Adjacent to OU1 sample data sets the statistical tests were performed including and excluding the outliers to determine if any difference in conclusions is obtained. The text of Attachment B has been revised accordingly.

Should you have any questions on the above, please do not hesitate to contact us.

Sincerely,

GHD

Julian Hayward

JH/kf/4

Encl.

cc: Tammy McPeek, OhioEPA
Technical Committee